EPA Region 5 Records Ctr.
357432

DWP 6-24-86

0971250010

EPA No CPC#

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 1 - SITE INFORMATION AND ASSESSMENT

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
ILD	064006414

II. SITE NAME AND LOCATION

01 SITE NAME (Legal, common, or descriptive name of site)	02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER
North Shore Materials Inc.	2500 Commonwealth Ave.

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY	07 COUNTY CODE	08 CONG DIST
North Chicago	IL	60064	Lake	097	13

09 COORDINATES LATITUDE	LONGITUDE	10 DIRECTIONS TO SITE (Starting from nearest public road)
42 50 20.0	087 56 05.0	Waukegan, IL 7½ Quad (7)

III. RESPONSIBLE PARTIES

01 OWNER (If known)	02 STREET (Business, mailing, residential)
North Shore Materials Inc.	2500 Commonwealth Ave.

03 CITY	04 STATE	05 ZIP CODE	06 TELEPHONE NUMBER
North Chicago	IL	60064	(312) 473-2210

07 OPERATOR (If known and different from owner)	08 STREET (Business, mailing, residential)

09 CITY	10 STATE	11 ZIP CODE	12 TELEPHONE NUMBER
			( )

13 TYPE OF OWNERSHIP (Check one)
☐ A. PRIVATE ☐ B. FEDERAL: _____ (Agency Name) ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL
☐ F. OTHER: _____ (Specify) ☑ G. UNKNOWN

14 OWNER/OPERATOR NOTIFICATION ON FILE (Check all that apply)
☐ A. RCRA 3001 DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☐ B. UNCONTROLLED WASTE SITE (CERCLA 103 c) DATE RECEIVED: ___/___/___ (MONTH DAY YEAR) ☑ C. NONE

IV. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION
☐ YES ☑ NO DATE: ___/___/___ (MONTH DAY YEAR)
BY (Check all that apply)
☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. STATE ☐ D. OTHER CONTRACTOR
☐ E. LOCAL HEALTH OFFICIAL ☐ F. OTHER: _____ (Specify)
CONTRACTOR NAME(S): _____

02 SITE STATUS (Check one)
☐ A. ACTIVE ☐ B. INACTIVE ☑ C. UNKNOWN

03 YEARS OF OPERATION
BEGINNING YEAR | ENDING YEAR ☐ UNKNOWN

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
~~Unknown~~ | PVC Plastics Manufacturer

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
~~Unknown~~ | Air (population/environment)

V. PRIORITY ASSESSMENT DWP in agreement w/ Terry Ayers, IEPA, because the only way to get information on the site is to inspect it. 6-24-86

01 PRIORITY FOR INSPECTION (Check one. If high or medium is checked, complete Part 2 - Waste Information and Part 3 - Description of Hazardous Conditions and Incidents)
☐ A. HIGH (Inspection required promptly) ☑ B. MEDIUM (Inspection required) ☑ C. LOW (Inspect on time available basis) ☐ D. NONE (No further action needed. Complete current disposition form)

VI. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NUMBER
		( )

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NUMBER	08 DATE
Kenneth L. Page	IEPA	RPMS	(217) 782-6760	04 10 86 (MONTH DAY YEAR)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
ILD	064006414

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

A SOLID
B POWDER FINES
C SLUDGE
D OTHER ____ (Specify)
E SLURRY
F LIQUID
G GAS

02 WASTE QUANTITY AT SITE

(Measures of waste quantities must be independent)

TONS
CUBIC YARDS
NO OF DRUMS

03 WASTE CHARACTERISTICS (Check all that apply)

A TOXIC
B CORROSIVE
C RADIOACTIVE
D PERSISTENT
E SOLUBLE
F INFECTIOUS
G FLAMMABLE
H IGNITABLE
I HIGHLY VOLATILE
J EXPLOSIVE
K REACTIVE
L INCOMPATIBLE
M NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE			
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS			
IOC	INORGANIC CHEMICALS			
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
	No Information		Available on this Site!		

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS			FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-12 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
ILD	064006414

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☐ A. GROUNDWATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED _____	02 ☐ OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	POTENTIAL	ALLEGED
01 ☐ B. SURFACE WATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED: _____	02 ☐ OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED
01 ☐ C. CONTAMINATION OF AIR 03 POPULATION POTENTIALLY AFFECTED: _____	02 ☐ OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED
01 ☐ D. FIRE/EXPLOSIVE CONDITIONS 03 POPULATION POTENTIALLY AFFECTED _____	02 ☐ OBSERVED (DATE: _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED
01 ☐ E. DIRECT CONTACT 03 POPULATION POTENTIALLY AFFECTED _____	02 ☐ OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED
01 ☐ F. CONTAMINATION OF SOIL 03 AREA POTENTIALLY AFFECTED _____ (Acres)	02 ☐ OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED
01 ☐ G. DRINKING WATER CONTAMINATION 03 POPULATION POTENTIALLY AFFECTED _____	02 ☐ OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED
01 ☐ H. WORKER EXPOSURE/INJURY 03 WORKERS POTENTIALLY AFFECTED: _____	02 ☐ OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED
01 ☐ I. POPULATION EXPOSURE/INJURY 03 POPULATION POTENTIALLY AFFECTED: _____	02 ☐ OBSERVED (DATE _____) 04 NARRATIVE DESCRIPTION	☐ POTENTIAL	☐ ALLEGED

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
ILD	064006414

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include names(s) of species)

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES (Spills runoff standing liquids leaking drums) — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

No Information Available on this site

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis reports)

a Drive-by site inspection was done on 042986, North Shore Materials is a compounding plastic manufacturer, PVC plastic is manufactured.

INSPECTION SUMMARY

On April 29, 1986 the North Shore Materials, Inc. at 2500 Commonwealth Avenue in North Chicago and Lake County was visited. Coleman Cable Systems rents one of their warehouses to North Shore Materials. About ten (10) different companies utilize warehouses in the same area. Some of the other companies are: Precision Polishing and Plating, Electrical Conductors, Photochem/Clayton, etc. Jim Salyers is the plant manager for North Shore Materials and Paul Bobel is the assistant plant manager. North Shore Materials is a plastics compounding facility (actual address is 2450 Davis Street), PVC plastics are manufactured. The facility is located in a warehouse shared by another company. Drums with contents unknown were stacked in the middle of the floor, boxes of plastics (all colors) were stacked along the walls. There was a drum storage yard in the parking lot. No pictures were taken.

KLP:jp:4/88

EXECUTIVE SUMMARY

To properly complete a preliminary assessment on any facility/site, adequate information is needed to reach conclusions on the impact of the facility on the population and/or environment via soil, air, groundwater, and surface water. Information is found within the Division Files of this Agency's (IEPA's) Water Pollution Control (WPC), Air Pollution Control (APC), Land Pollution Control (LPC) and Public Water Supplies (PWS). All of the above media was exhausted for information on this facility. The Hazardous Waste Generator Report and the Hazardous Waste Data Management System were utilized and no information was found.

This preliminary assessment is assigned a low priority, and a site inspection should be performed on available time basis.

KP:tk:4/10/18(4/14/86)

(b) Training of staff and design of processes and operations to ensure that complicated plant is kept under proper control. This may entail the use of sophisticated process control equipment for exothermic chemical reactions and of methods of halting reactions that go out of hand. Operators must be carefully selected and given formal training, tailor-made for the particular site. This should involve an understanding of the basic process chemistry and of the raw materials and their properties, recognition of potential hazards and corrective action. Since every action performed by the operator must be anticipatory in nature he must be correctly motivated and trained throughout his working life to develop a safety awareness.

(c) The establishment of an emergency plan and provision of adequate facilities for its implementation to fight fires and to deal with explosions and case of gassing.

These essential requirements should be combined with a general safety policy for preventing the common types of accident in factories, such as falls of persons or materials, lifting and carrying injuries, projections and flying objects

Personal protective equipment required by employees will normally include hand and arm protection, eye and face protection against splashes of molten material, and safety helmets. In certain circumstances respiratory protective equipment and ear protection against high noise levels may be necessary. Worker exposure to dust and fumes can also be reduced by limiting the length of time and number of spells per day the employee is expected to work in such conditions.

Processes which may emit dangerous fumes should be equipped with exhaust ventilation and splash guards should be fitted round machines from which there may be projections of molten materials.

LAW, P. K.

Health hazards:

CIS 80-1111 "Old and new problems of occupational skin disorders in plastics production and transformation" (Oude en nieuwe, voornamelijk arbeidsdermatologische problemen bij het produceren en verwerken van kunststoffen). Malten, K. E. *Tijdschrift voor sociale geneeskunde* (Amsterdam), 2 Apr. 1980. 58/7 (250-272). Illus. 100 ref. (In Dutch)

CIS 81-1381 "'Plastics-worker's lung'—Bronchopulmonary pathology related to plastics" ("Le poumon plastique"—Pathologie broncho-pulmonaire liée aux matières plastiques). Antnoine, D.; Martinet, Y.; Zuck, P.; Peiffer, G.; Dangelzer, J.; Lamy, P. *Le poumon et le cœur* (Paris), 1980, 36 (135-146) 43 ref. (In French)

CIS 80-731 "Effect of pyrolysis temperature on relative toxicity of some plastics". Hilado, C. J.; Casey, C. J.; Schneider, J. E. *Fire Technology* (Boston), May 1979, 15/2 (122-129). Illus. 10 ref.

Health and safety measures:

CIS 81-2061 *Control technology in the plastics and resins industry.* DHHS (NIOSH) publication No. 81-107 (Washington, DC, US Government Printing Office, Jan. 1981), 224 p. Illus. 25 ref.

Guidelines for the safe production of phenolic resins (London, British Plastics Federation, Thermosetting Resin Group, 1979).

The safe use of powdered and fibrous additive materials in the UK plastics processing industry (London, British Plastics Federation, 1979).

The SPI plastics safety handbook (Boston, Society of the Plastics Industry, 1981).

Ventilation handbook for the rubber and plastics industries (Shawbury, Rubber and Plastics Research Association of Great Britain, 1980).

Plastics processing industry

The plastics processing industry converts bulk polymeric material into finished articles.

Raw materials. The processing section of the plastics industry receives its raw materials for production in the following forms:

(a) fully compounded polymeric material, in the form of pellets, granules or powder, which is fed directly into the machinery for processing;

(b) uncompounded polymer, in the form of granules or powder, which must be compounded with additives before it is suitable for feeding to machinery;

(c) polymeric sheet, rod, tube and foil materials which are processed further by the industry;

(d) miscellaneous materials which can be fully polymerised matter in the form of suspensions or emulsions (generally known as latices) or liquids or solids which can polymerise, or substances in an intermediate state between the reactive raw materials and the final polymer—some of these are liquids and some true solutions of partially polymerised matter in water of controlled pH or in organic solvents.

Compounding. The manufacture of compound from polymer entails the intimate mixing of the polymer with additives. Though a great variety of machinery is employed for this purpose, where powders are dealt with, ball mills or high-speed propeller mixers are most common, and where plastic masses are being mixed, kneading machines such as the open rolls or Banbury-type mixers, or extruders themselves are normally employed.

The additives required by the industry are many in number, and range widely in chemical type. Of some 20 classes, the most important are:

(a) plasticisers—generally esters of low volatility;

(b) antioxidants—organic chemicals to protect against thermal decomposition during processing;

(c) stabilisers—inorganic and organic chemicals to protect against thermal decomposition and against degradation from radiant energy;

(d) lubricants;

(e) fillers—inexpensive matter to confer special properties or to cheapen compositions;

(f) colorants—inorganic or organic matter to colour compounds.

Conversion processes

All the conversion processes call on the "plastic" phenomenon of polymeric materials and fall into two types. Firstly, those where the polymer is brought by heat to a plastic state in which it is given a mechanical constriction leading to a form which it retains on consolidation and cooling. Secondly, those in which a polymerisable material—which may be partially polymerised—is fully polymerised by the action of heat, or of a catalyst or by both acting together whilst under a mechanical constraint leading to a form which it retains when fully polymerised and cold. Plastics technology has developed to exploit these properties to produce goods with the minimum of human effort and the greatest consistency in physical properties. The following processes are commonly used.

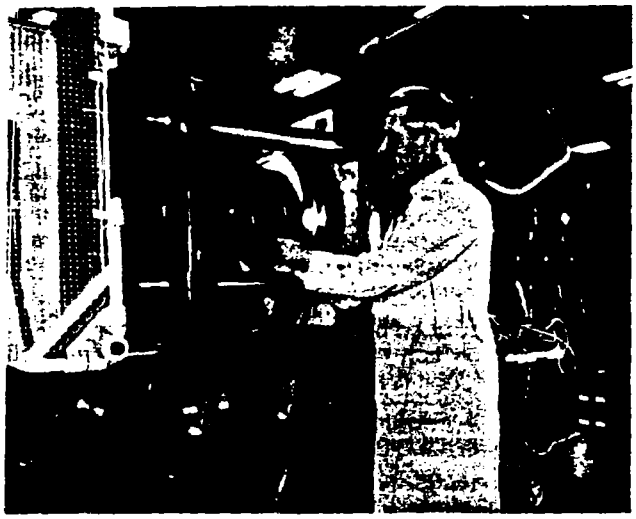

Figure 1. An operator removing a polypropylene bowl from an injection-moulding machine.

Compression moulding. This consists of heating a plastic material, which can be in the form of granules or powder, in a mould which is held in a press. When the material becomes "plastic" the pressure forces it to conform to the shape of the mould. If the plastic is of the type that hardens on heating, the formed article is removed after a short heating period by opening the press. If the plastic does not harden on heating, cooling must be effected before the press can be opened. Articles made by compression moulding include bottle caps, jar closures, electric plugs and sockets, toilet seats, trays and fancy goods. Compression moulding is also employed to make sheet for subsequent forming in the vacuum forming process or for building into tanks and large containers by welding or by lining existing metal tanks.

Transfer moulding. This is a modification of compression moulding. The thermosetting material is heated in a cavity and then forced by a plunger into the mould, which is physically separate and independently heated from the heating cavity. It is preferred to normal compression moulding when the final article has to carry delicate metallic inserts such as in small electrical switchgear, or when, as in very thick objects, completion of the chemical reaction could not be obtained by normal compression moulding.

Injection moulding. In this process, plastics granules or powder are heated in a cylinder (known as the barrel), which is separate from the mould. The material is heated until it becomes fluid, whilst it is conveyed through the barrel by a helical screw and then forced into the mould where it cools and hardens. The mould is then opened mechanically and the formed articles removed. This process is one of the most important in the plastics industry. It has been extensively developed during the past two decades and has become capable of making articles of considerable complexity at very low cost (see figure 1).

Though transfer and injection moulding are identical in principle, the machinery employed is very different. Transfer moulding is normally restricted to thermosetting materials and injection moulding to thermoplastics.

Extrusion. This is the process in which a machine softens a plastic, forces it through a die which gives it shape that it retains on cooling. The products of extrusion are tubes or rods which may have cross sections of almost any configuration. Tubes for industrial or domestic purposes are of course produced in this way, but other articles can be made by subsidiary processes. For example, sachets can be made by cutting tubes and sealing both ends, and bags from thin-walled flexible tube by cutting and sealing one end.

The process of extrusions has two major modifications. In one, flat sheet is produced. This sheet can be converted into useful goods by other processes, for example vacuum forming.

The second modification is a process in which the extruded tube is formed and when still hot is greatly expanded by a pressure of air maintained inside the tube. This results in a tube which can be several feet in diameter with a very thin thickness of wall. On slitting, this tube gives film which is extensively used in the packaging industry for wrapping. Alternatively the tube can be folded flat to give a two-layer sheet which can be used to make simple bags by cutting and sealing.

Calendering. In this process, a plastic is fed to two or more heated rollers and forced into a sheet by passing

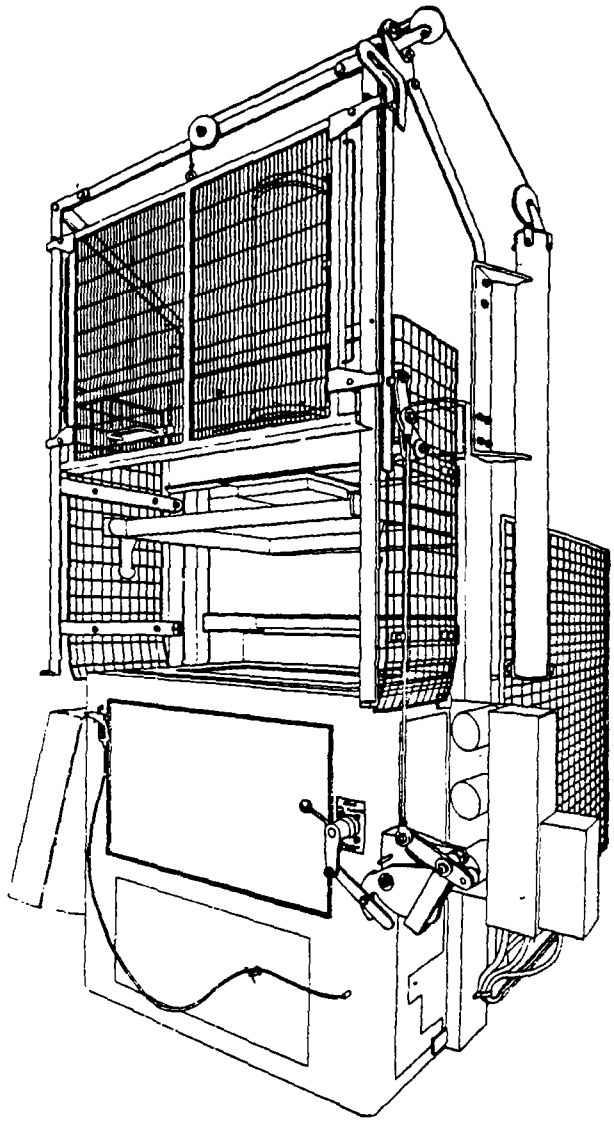

Figure 2. A fully guarded vacuum-forming machine with the safety gate open. In this state, it is impossible to operate the clamping frame until the safety gate is fully closed due to the mechanical interlock between the safety gate and the operating lever. An electrical interlock prevents operation of any other part of the machine until the clamping frame is closed. *(By courtesy of the British Plastics Federation.)*

through a nip between two such rollers and cooling thereafter. Sheet thicker than film is made in this way. Sheet so made is employed in industrial and domestic applications and as the raw material in the manufacture of clothing, pram covers and inflated goods such as toys.

Blow moulding. This process can be regarded as a combination of the process of extrusion and thermoforming. A tube is extruded downwards into an opened mould; as it reaches the bottom the mould is closed round it and the tube expanded by air pressure. Thus the plastic is forced to the sides of the mould and the top and bottom sealed. On cooling the article is taken from the mould. This process makes hollow articles of which bottles are the most important.

The compression and impact strength of certain plastic products made by blow moulding can be considerably improved by using stretch-blow moulding techniques. This is achieved by producing a pre-form which is subsequently expanded by air pressure and stretched biaxially. This has led to such an improvement in the burst pressure strength of PVC bottles that they are now used for carbonated drinks.

Rotational moulding. This process is used for the production of moulded articles by heating and cooling a hollow form which is rotated to enable gravity to distribute finely divided powder or liquid over the inner surface of that form. Articles produced by this method include footballs, dolls and other similar articles.

Film casting. Apart from the extrusion process, films can be formed by extruding a hot polymer on to a highly polished metal drum, or a solution of polymer can be sprayed on to a moving belt.

An important application of certain plastics is the coating of paper. In this, a film of molten plastic is extruded on to paper under conditions in which the plastic adheres to the paper. Board can be coated in the same way. Paper and board so coated are widely used in packaging, and board of this type in box making.

Thermo-forming. Under this heading are grouped a number of processes in which a sheet of a plastic material, more often than not thermoplastic, is heated, generally in an oven, and after clamping at the perimeter is forced to a predesigned shape by pressure which may be from mechanically operated rams or by compressed air or steam. For very large articles the "rubbery" hot sheet is manhandled with tongs over formers. Products so made include external lighting fittings, advertising and directional road signs, baths and other toilet goods, and contact lenses.

Vacuum forming. There are many processes which come under this general heading, all of which are aspects of thermal forming, but they all have in common that a sheet of plastic is heated in a machine above a cavity around the edge of which it is clamped, and when pliable it is forced by suction into the cavity, where it takes some specific form and cools. In a subsequent operation, the article is trimmed free from the sheet. These processes produce very cheaply thin-walled containers of all types, as well as display and advertising goods, trays and similar articles, and shock-absorbing materials for packing goods such as fancy cakes, soft fruit, and cut meat (see figure 2).

Laminating. In all of the various laminating processes, two or more materials in the form of sheets are compressed to give a consolidated sheet or panel of special properties. At one extreme are found decorative laminates made from phenolic and amino resins, at the other complex films used in packaging having, for example, cellulose, polyethylene and metal foil in their constitution.

Resin technology processes. These include plywood manufacture, furniture manufacture and the construction of large and elaborate articles such as car bodies and boat hulls from glass fibre impregnated with polyester or epoxy resins. In all these processes, a liquid resin is caused to consolidate under the action of heat or of a catalyst and so bind together discrete particles or fibres or mechanically weak films or sheets, resulting in a robust panel of rigid construction.

Finishing processes

Included under this heading are a number of processes common to many industries, for example use of paints and adhesives. There are, however, a number of specific techniques used for the welding of plastics. These include the use of solvents such as chlorinated hydrocarbons, methyl ethyl ketone (MEK) and toluene, which are used for bonding together rigid plastics sheet for general fabrication, advertising display stands, and similar work. High frequency (HF) radiation utilises a combination of mechanical pressure and electromagnetic radiation with frequencies generally in the range of 27-100 mHz. This method is commonly used for welding together flexible plastic material in the manufacture of wallets, briefcases and children's push chairs. Ultrasonic energies are also used in combination with mechanical pressure for a similar range of work.

HAZARDS AND THEIR PREVENTION

Accident hazards. The majority of the plastics conversion processes depend almost entirely upon the use of machinery. As a result the principal hazards are those associated with the use of such machinery, not only during normal operation but also during cleaning, setting and maintenance of the machines.

Compression, transfer, injection and blow moulding machines all have press platens with a locking force of many tonnes per square centimetre. Adequate guarding should be fitted to prevent amputation or crushing injuries. This is generally achieved by enclosing the dangerous parts and by interlocking any movable guards with the machine controls. An interlocking guard should not allow dangerous movement within the guarded area with the guard open and should bring the dangerous parts to rest or reverse the dangerous motion if the guard is opened during the machine operation.

Where there is a severe risk of injury at machinery such as at the platens of moulding machines, and regular access to the danger area, then a higher standard of interlocking is called for. This may be achieved by a second independent interlocking arrangement at the guard to interrupt the power supply and prevent a dangerous motion when it is open.

For processes involving plastic sheet, a common machinery hazard found is inrunning traps between rollers or between rollers and the sheet being processed. These occur at tension rollers and haul-off devices at extrusion plant and calenders. Safeguarding may be achieved by using a suitably located trip device, which immediately brings the rollers to rest or reverses the dangerous motion.

Many of the plastics processing machines operate at high temperatures and severe burns may be sustained if parts of the body come into contact with hot metal or plastics. Where practical, such parts should be protected when the temperature exceeds 50 °C. In addition, blockages which occur on injection moulding machines and extruders can violently free themselves. A safe

system of work should be followed when attempting to free frozen plugs of plastic, which should include the use of suitable gloves and face protection.

Processing machinery is becoming increasingly sophisticated. Machine functions are now controlled by programmed electronic control systems which may also control mechanical take off devices or are linked with robots. On new machinery there is less need for an operator to approach the danger areas and it follows that safety at machinery should correspondingly improve. There is, however, a greater need for setters and engineers to approach these parts. It is essential therefore that safe systems of work are formulated before this type of work is carried out, particularly where full protection by the machine safety devices cannot be achieved In addition adequate back up or emergency systems should be so designed and devised to deal with situations when the programmed electronic control fails for any reason, for example during the loss of the power supply.

It is important that machines are properly laid out in the workshop with good clear working spaces for each. This assists in maintaining high standards of cleanliness and tidiness. The machines themselves should also be properly maintained and the safety devices checked on a routine basis.

Good housekeeping is essential and particular attention should be paid to keeping the floors clean. Without routine cleaning, floors will become badly contaminated from machine oil or spilled plastics granules. Methods of work including safe means of access to areas above floor level, e.g. at machines when tool changing should also be considered and provided.

Adequate spacing should also be allowed for the storage of raw materials and finished goods; these areas should be clearly designated.

Plastics are good electrical insulators and, because of this, static charges can build up on machinery on which sheet or film travels. These charges can have a potential high enough to cause a serious accident or act as sources of ignition. Static eliminators should be used to reduce these charges and metal parts properly earthed.

HF welding presents two hazards. In addition to the potential mechanical trapping hazard between the electrodes for power operated units an electrical HF burn hazard also exists at the electrodes.

Interlocked guarding can be used at larger machines with sliding tables to remove these risks. For smaller pedal-operated machines, the electrodes should be shielded to prevent inadvertent contact by the operator. Generally these machines should be designed so that the electrodes do not operate until the last fraction of the closing stroke.

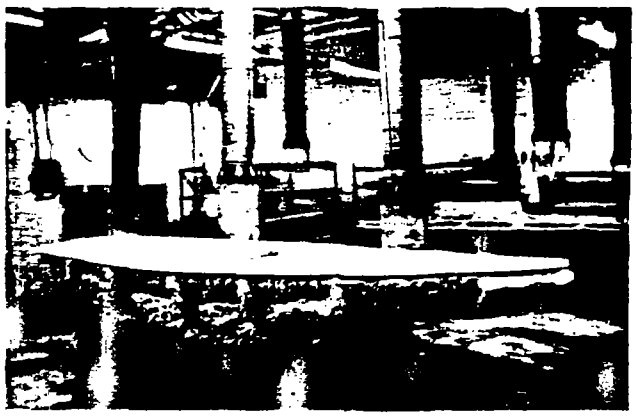

Figure 3. General extraction provided in the manufacture of glass reinforced plastics (GRP) boats. It is important that the workroom ventilation is properly balanced by sufficient air brought into the workroom. *(By courtesy of Performance Sailcraft Limited, Banbury.)*

Figure 4. Ventilated cabinet designed to provide a high air velocity extracted across the face of the cabinet. This particular cabinet is used for the filling of moulds using 4,4'-methylene-*bis*-(2-chloroaniline) (MOCA) as a curing agent. *(By courtesy of Conveyor Improvements Limited, Notts.)*

Increasingly, waste plastics material is being reprocessed using granulators and subsequently blending with new stock. Granulators should be totally enclosed to prevent any possibility of reaching the rotors through the discharge and feed openings. The design of the feed openings on large machines should be such as to prevent whole body entry. The rotors operate at high speed and covers should not be removed until they have come to rest. Where interlocking guards are fitted, they should prevent contact with the blades until they have completely stopped.

Fire and explosion hazards. Plastics are combustible materials, although not all polymers support combustion.

In finely divided powder form, many can form explosive concentrations in air. Where this is a risk, the powders should be controlled preferably in an enclosed system, with sufficient relief panels venting at low pressure (about 0.05 bar) to a safe place. Scrupulous cleanliness is essential to prevent accumulations in the workrooms which may become airborne and cause a secondary explosion.

Polymers may be subject to thermal degradation and pyrolysis at temperatures not greatly above normal processing temperatures. Under these circumstances, sufficient pressures may build up in the barrel of an extruder, for example, to eject molten plastic and any solid plug of plastic causing an initial blockage.

Flammable liquids are commonly used in this industry, for example, as paints, adhesives, cleaning agents and in solvent welding. Glass-fibre resins also evolve flammable styrene vapours. Stocks of such liquids should be reduced to a minimum in the workroom, and stored in a safe place when not in use. Storage areas should include safe places in the open air or a fire resisting store.

Peroxides used in the manufacture of glass reinforced plastics (GRP) resins should be stored separately from flammable liquids and other combustible materials and not subjected to extremes of temperatures.

Health hazards. There are a number of potential health hazards associated with the processing of plastics and these are summarised below. The raw plastics are rarely used on their own and appropriate precautions should be taken regarding the additives used in the various formulations. Additives used include lead soaps in PVC and certain organic and cadmium dyestuffs.

There is a significant risk of dermatitis from liquids and powders usually from "reactive chemicals" such as phenol formaldehyde resins (before cross linking), urethanes and unsaturated polyester resins used in the production of GRP products. Suitable protective clothing should be worn.

Fumes from the thermal degradation of polymers during hot processing under normal conditions are not a significant problem. Particular care, however, must be taken to avoid inhalation of pyrolysis products under adverse conditions, for example, purging of the extruder barrel. Conditions of good local exhaust ventilation may be necessary. Problems have occurred for example, where operators have been overcome by hydrochloric acid gas and suffered from "polymer fume fever" following overheating of PVC and PTFE respectively.

There is also a danger of inhalation of toxic fumes from certain thermoset resins. Examples include isocyanates used in polyurethanes. Inhalation of isocyanates can lead to severe respiratory distress, and once sensitised, persons should be transferred to alternative work. A similar problem exists with formaldehyde resins. In both these examples, a high standard of exhaust ventilation local to the work is necessary. In the manufacture of GRP articles, significant quantities of styrene vapour is given off and this work must be done in conditions of good general ventilation in the workroom (see figures 3 and 4).

There are also certain hazards which are common to a number of industries. These include the use of solvents for dilution or for purposes mentioned previously. Chlorinated hydrocarbons are commonly used for cleaning and bonding and without adequate exhaust ventilation persons may well suffer from narcosis.

Waste disposal of plastics by burning should be done under carefully controlled conditions; for example, PTFE and urethanes should be in an area where the fumes are vented to a safe place.

Very high noise levels are generally obtained during the use of granulators, which may well lead to hearing loss to the operators and persons working nearby. This hazard can be confined by separating this equipment from other working areas. Preferably the noise levels should be reduced at source. This has successfully been achieved by coating the granulator with sound deadening material and fitting baffles at the feed opening. There may also be a hazard to hearing created by audible sound produced from ultrasonic welding machines as a normal accompaniment of the ultrasonic energies. Suitable enclosures can be designed to reduce the received noise levels and can be interlocked to prevent a mechanical hazard.

As a minimum standard, persons working in areas of high noise levels should wear suitable hearing protection.

BRITTON, T. J.

[redacted]

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Platinum, alloys and compounds

Platinum (Pt)
a.w. 195.09
sp.gr. 21.45
m.p. 1 768 °C

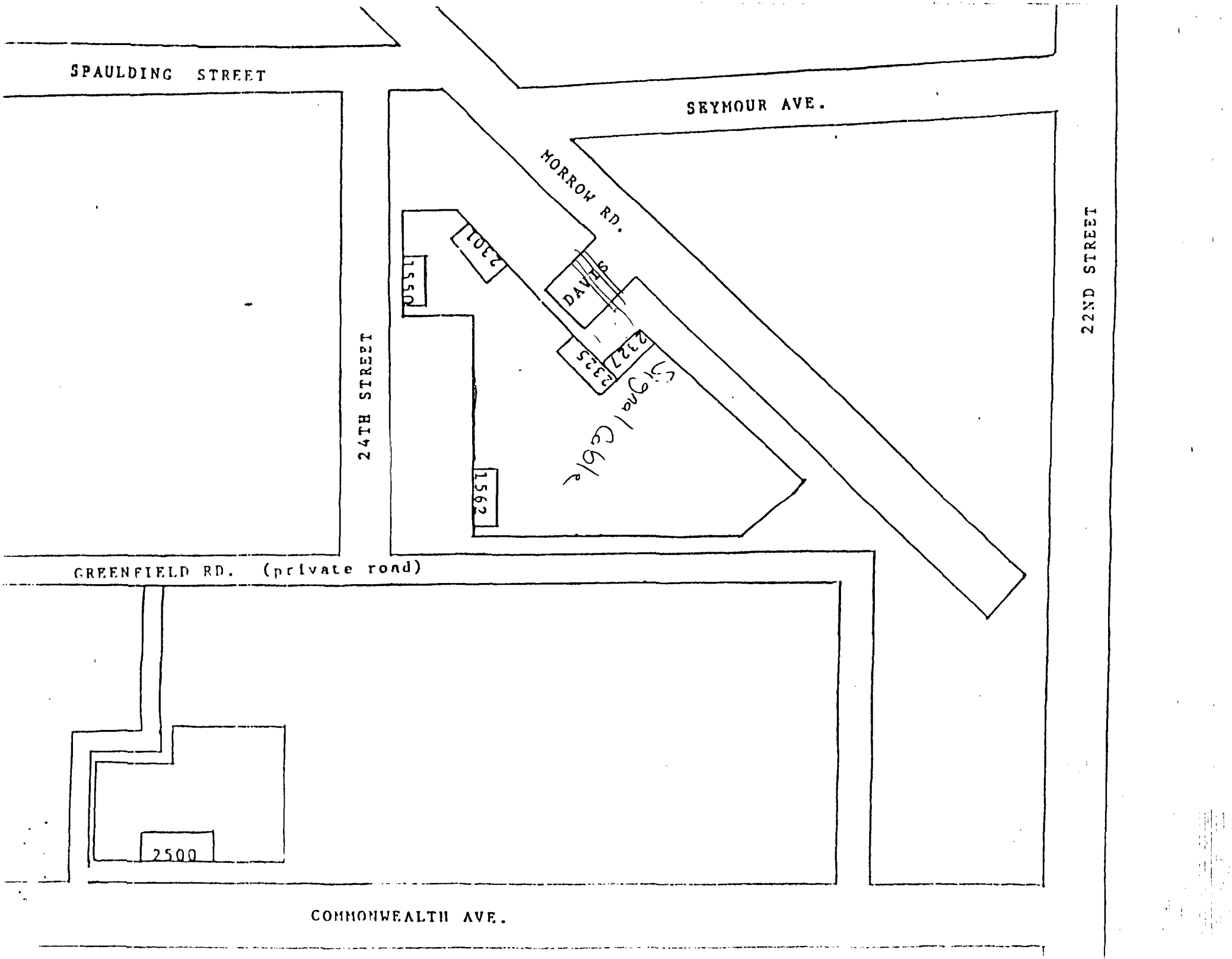
TWA OSHA soluble salts 0.002 mg/m³

Properties. Platinum is a silver-white lustrous metal which is malleable, ductile, and resistant to oxidation and chemical attack. Platinum is also available as a black powder and as a spongy mass. Platinum forms a series of chloroplatinate salts which are soluble in water.

Occurrence. Platinum occurs in native form and in a number of mineral forms, including sperrylite ($PtAs_2$), cooperite (Pt,Pd)S and braggite (Pt,Pd,Ni)S. Platinum is sometimes found with palladium as the arsenide and selenide. The concentration of platinum in the earth's crust is 0.005 ppm.

Production. In refining of nickel-copper ores the platinum-group metals remain with the nickel sulphide. After removal of the nickel, the residues are separated and refined by a complex chemical treatment based on a solution in aqua regia and precipitation as the double ammonium chlorides. The precipitates are calcined, yielding a spongy mass of pure platinum.

Uses. Platinum and its alloys are used as catalysts in petroleum reformation, ammonia oxidation, sulphur dioxide oxidation, hydrogenation and dehydrogenation. Ceramic honeycomb materials impregnated with platinum are used for emission control as catalytic mufflers in vehicles. Platinum is used in electrical contacts, electrodes, thermocouples, spinnerets for fibrous glass and rayon manufacture, reflecting or ornamental surfaces and jewelry. Platinum drugs appear to be active against a wide range of tumours in animals and in man. Because of the permanence of platinum it is used for national and international standards for weight, length and temperature measurement. Platinum is manufactured into sheet, wire, foil and it still has wide use in laboratory apparatus.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SEYMOUR AVE.
MORROW RD.
22ND STREET
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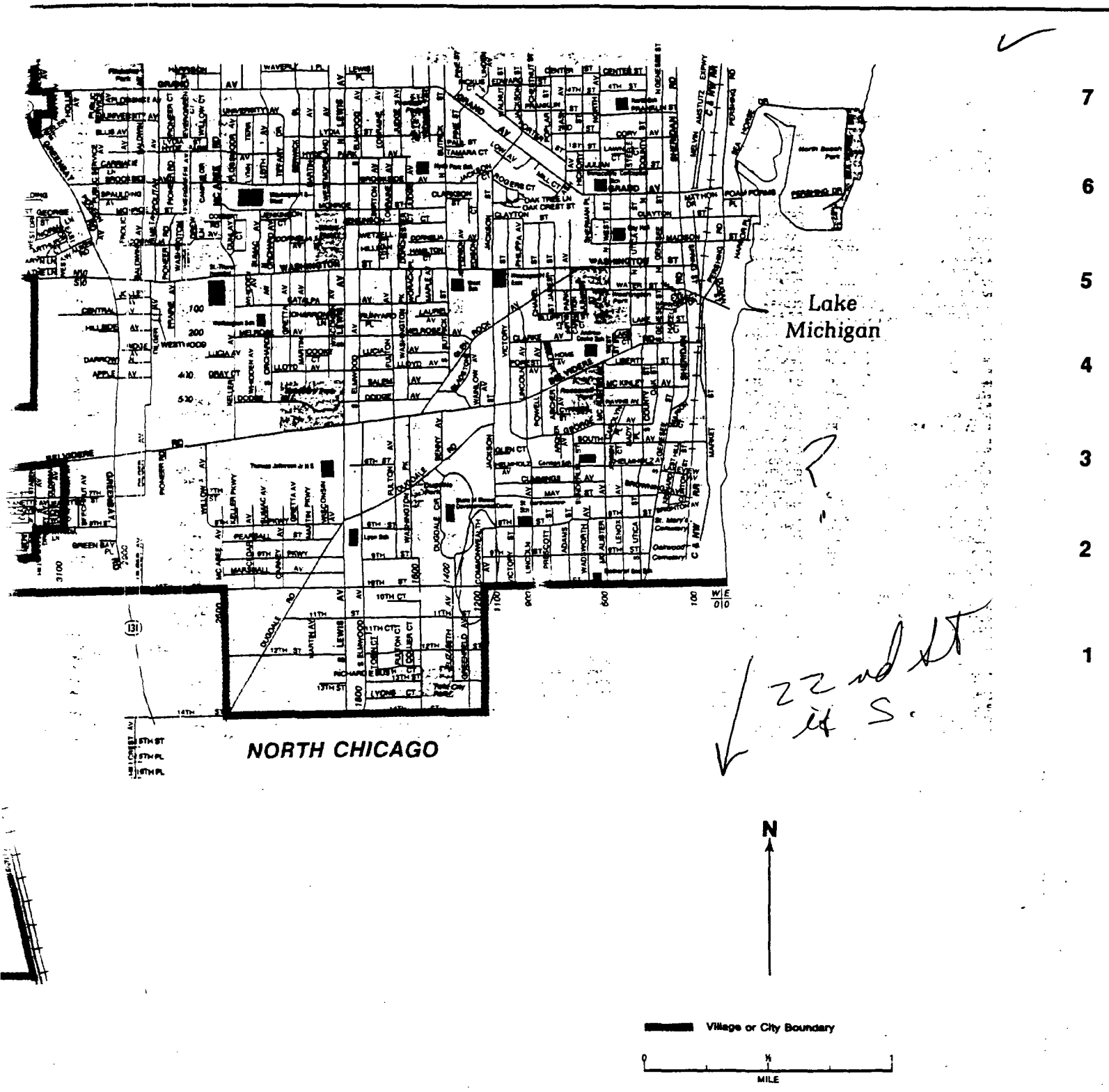
1550
DAVIS
2327
2325
1562
GREENFIELD RD. (private road)
2500
COMMONWEALTH AVE.



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Gurnee Street Guide

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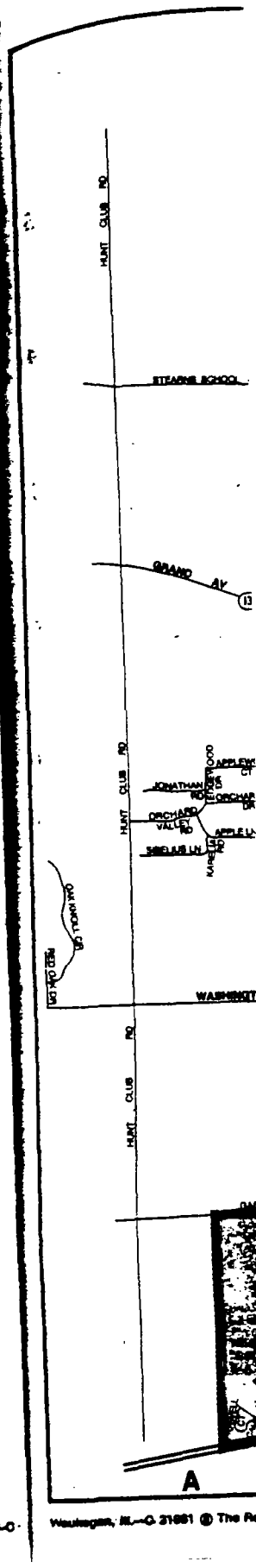

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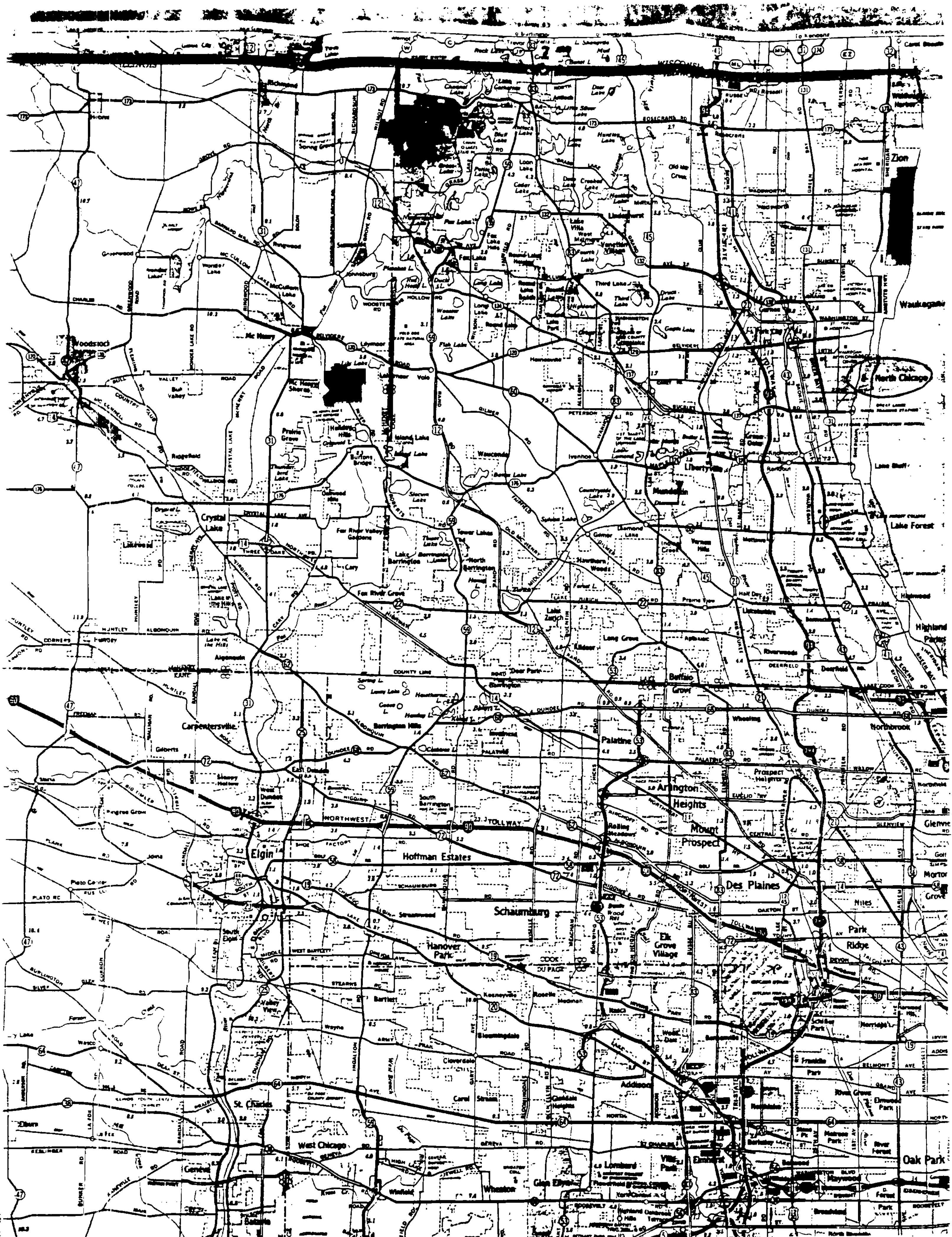

Richmond
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Antioch
Lindenhurst
Zion
Waukegan
North Chicago
Woodstock
Mc Henry
Lakemoor
Volo
Wonder Lake
McCullom Lake
Greenwood
Ridgefield
Crystal Lake
Lakewood
Prairie Grove
Island Lake
Wauconda
Ivanhoe
Libertyville
Mundelein
Vernon Hills
Lake Bluff
Lake Forest
Cary
Fox River Grove
Lake Barrington
North Barrington
Lake Zurich
Long Grove
Kildeer
Lincolnshire
Highwood
Highland Park
Algonquin
Huntley
Deer Park
Barrington
Barrington Hills
Buffalo Grove
Wheeling
Deerfield
Northbrook
Riverwoods
Carpentersville
Gilberts
East Dundee
West Dundee
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